Code: R7100203

R07

B.Tech I Year (R07) Supplementary Examinations, June 2013
APPLIED PHYSICS
(Common to EEE, ECE, CSE, EIE, IT, E.Con.E, ECC and CSS)

Time: 3 hours
Max Marks: 80

Answer any FIVE questions
All questions carry equal marks

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1. (a) Define crystal lattice, unit cell, and lattice parameter and coordination number.
   (b) Derive an expression for the inter-planar spacing in the case of cubic structure.
   (c) Monochromatic X-rays of wavelength 0.071 nm is diffracted by (110) plane of rock salt with lattice constant of 0.28 nm. Find the glancing angle for the second order diffraction.

2. (a) What are the properties of matter waves? Derive an expression for de-Broglie wavelength.
   (b) Obtain an expression for the energy of a particle in a one dimensional potential box.

3. (a) Define relaxation time and mean free path. Explain the salient features of classical free electron theory.
   (b) Discuss the motion of electron in a periodic potential

4. (a) Explain different polarizations in dielectrics along with their frequency dependencies.
   (b) What is ferromagnetism? Explain the hysteresis curve on the basis of domains.
   (c) The magnetic field intensity of ferric oxide is 10^6 amp/mt. If the susceptibility of the material is 1.5×10^{-3}, calculate the magnetization of the material and the flux density.

5. (a) Describe drift and diffusion currents. Derive their expressions.
   (b) What is super conductivity? Explain Meissner effect. What are the applications of super conductors?

6. (a) With suitable energy level diagrams, explain the principle, construction and working of a ruby laser.
   (b) Write application of lasers in four different fields.

7. (a) Explain how the optical fibres are classified.
   (b) What is holography? Explain the construction of a hologram.
   (c) Calculate the numerical aperture and acceptance angle with core and cladding refractive indices being 1.48 and 1.45 respectively.

8. (a) Describe the basic principles of nanomaterials.
   (b) What are the different fabrication methods of nanomaterials?

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